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AUTHOR Wood, Carolyn M.
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ABSTRACT

This study investigated the predictive power of four indices of cognitive style, the intercorrelations of cognitive style with selected cognitive and affective variables, and the test-retest reliability of the Matching Familiar Figures (MFF) test. The social, emotional, and cognitive development of 38 kindergarten children was assessed by their teacher (using the Maryland Systematic Teacher Observation Inventory) in November of their kindergarten year. The children's cognitive style (MFF), school readiness (Metropolitan Readiness Test), and self concept (Florida Key teacher rating scale) were assessed in May. The MFF was administered a second time one week later. At the end of the first grade, the children's school achievement in vocabulary, reading comprehension, and mathematics concepts was measured using the Iowa Test of Basic Skills. Multiple regression techniques were used to determine the contribution of several factors to the prediction of school achievement. These factors were (1) error and mean latency indices of cognitive style (after the Kagan construct), (2) tempo and efficiency indices of cognitive style (after the Salkind and Wright model), (3) readiness, and (4) teacher ratings. Results indicated that a combination of these factors explained a significant amount of variance in school achievement. Results of stepwise regression indicated further that, when the variance due to readiness was removed, impulsivity contributed significantly to the variance accounted for in achievement among boys. Analysis of the intercorrelations among cognitive style and all other variables produced expected correlational patterns. Test-retest reliability correlations on the MFF were found to range from .58 for males to .95 for females with a reliability of .87 for the total group. (JMB)

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Cognitive Style, School Readiness, and Behavior as Predictors of First-Grade Achievement

CAROLYN M. WOOD, Harford County (MD) Public Schools

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Abstract

Test-retest reliabilities of MFF latency and error and of composite tempo (impulsivity) and style (efficiency) scores, along with intercorrelations among these variables, were determined for 40 end-of-kindergarten subjects. Expected correlational patterns and moderate reliabilities were obtained. Regression analysis applied to these indices of style, in combination with school readiness and behavior ratings, both obtained during kindergarten, yielded a multiple r of 0.75 ($p < .01$), with first grade achievement as the criterion. Stepwise regression indicated that with readiness entered first as a predictor, impulsivity contributes significantly among boys to the variance accounted for in achievement.

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Cognitive Style, School Readiness, and Behavior as Predictors of First Grade Achievement

Carolyn M. Wood
Harford County (Md.) Public Schools

The reflection-impulsivity construct postulated by Jerome Kagan et al (1964) has stimulated considerable interest in the psychological significance of cognitive style, its relationship to personality and to the learning characteristics of individuals, and its possible usefulness as a predictor of academic achievement. According to Kagan's construct, cognitive style refers to an individual's characteristic speed and accuracy in responding to a problem-solving situation. Operationally, it is typically defined by performance on the Matching Familiar Figures (MFF) Test (Kagan et al, 1964). With this onstrument, the subject is presented with a picture of an object (stimulus), followed by an array of highly similar variants. The subject must determine which variant is identical to the stimulus. His performance is assessed in terms of the average time to first response (latency) and the total number of incorrect choices made in the course of responding to the twelve MFF items (total errors). According to Kagan's scoring procedure, "impulsivity" is associated with comparatively high errors and low latency, while "reflection" is associated with comparatively few errors and high latency.

In his original research, Kagan emphasized the importance of both latency and errors in the determination of an individual's characteristic response style and also pointed to the distinction between style and mental ability. He did suggest, however, that the reflective subject would tend to enjoy an advantage over the impulsive in the solution of complex

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problems with multiple solutions. In academic situations, the value of a reflective as opposed to an impulsive style would tend to vary with the subject matter being learned.

Finding the reflection-impulsivity construct conceptually appealing as a source of individual differences, with potential for explaining personality traits, school learning, and behavior, many investigators have attempted to establish relationships between style, self and teacher ratings of personality traits, problem-solving performance, mental ability, and academic achievement. Results of these attempts suggest limited success. Nadeau (1968), for example, found no relationship between teacher ratings of personality traits in nursery school children and the children's reflection-impulsivity. Ault et al (1972) found reflective children higher in attention than impulsive children but found no differences in motivation. Block et al (1974), working with pre-school children, noted a tendency for the highest ability children to be classified as "slow accurate" and the lowest ability children "slow inaccurate" based on their MFF test performance. They also found accurate children to be more highly rated by their teachers on a variety of personality traits, particularly flexibility and adaptability.

Becker (1976) found no significant correlation between teacher classification of students as "at risk" versus "not at risk" of school failure and impulsivity, although there was a trend towards a higher incidence of "at risk" rating among impulsive children. Bentler and McClain (1976), finding no relationship between impulsivity-reflection and self, peer, and teacher ratings of impulsivity, achievement motivation, test anxiety, and extraversion, concluded that the construct may be situation-specific, with little relevance to behaviors not directly related to problem-solving.

Attempts to establish relationships between mental ability and reflection-impulsivity have yielded similarly inconsistent results. Messer(1970) found no difference between impulsive and reflective third graders on the WISC Information and Vocabulary subtests but did notice a significantly higher incidence of impulsivity among children who had failed first grade. Toner, Holstein, and Hetherington (1977) found a slight but statistically significant relationship between MFF total error and IQ in girls; the correlation between MFF latency and IQ was nonsignificant. The possibility that reflection-impulsivity may serve as a proxy for developmental differences between children rather than as an explanation of stable and enduring characteristics of information processing behavior was raised by Achenbach and Weisz (1975) when they found that mental age, calculated from performance on the Stanford-Binet, was a better predictor than initial reflection-impulsivity of subsequent classification when the MFF and KRISP (Wright, 1973) were administered six months later to pre-schoolers.

Relative to the prediction of academic achievement, little evidence has emerged thus far in support of the usefulness of cognitive style. Haskins and McKinney (1976), seeking to determine the relative contributions of latency and error to the prediction of academic achievement in elementary school students, found that only error contributed significantly to the prediction.

Problems arising from the psychometric characteristics of the MFF, particularly its questionable reliability with young children and the scoring procedure by which reflective-impulsive categorization is determined, have been identified by many investigators. The median-split scoring, which separates fast-inaccurate (impulsive) from slow-accurate (reflective)

subjects and ignores the remainder, results both in considerable loss of information and a high rate of misclassification. As a remedy for both ills, Egeland and Weinberg (1976) have suggested the use of a composite standard score incorporating both latency and errors.

Salkind and Wright (1977), following this suggestion, have postulated two orthogonal dimensions of style, one reflecting tempo (reflection-impulsivity), the other processing effectiveness (efficiency-inefficiency). The former is defined operationally as the difference between the individual's standard scores (based upon norms generated by the authors) for error and latency (i. e., $I_i = z_{ei} - z_{li}$, where I_i = impulsivity for the ith person); the latter is defined as the sum of the individual's standard scores for error and latency (i. e. $Ei = z_{ei} + z_{li}$, where E_i = efficiency for the ith person). According to this scheme, large positive I scores indicate high impulsivity, and large positive E scores reflect low efficiency. The contribution of each variable separately to the predictive power of mental ability with academic achievement as the criterion must be empirically tested, as Salkind and Wright have recommended.

The present study is designed to continue the search for correlates of cognitive style and to explore its usefulness as a predictor of school achievement in young children. Analysis is made also of the predictive power of each of four indices of style—MFF mean latency and total errors and Salkind and Wright's tempo and efficiency composites based upon their own MFF age norms. The reliability of the MFF test for the experimental sample will be assessed additionally.

Method

The research design called for the gathering of data describing a

variety of cognitive and affective characteristics, including cognitive style, in a population consisting of all children enrolled in the kindergarten in a small, rural, predominantly moderate-to-low SES elementary school. In order to assess the reliability of the assessment of cognitive style for this subject population, the MFF was administered twice to each subject. School readiness and self-concept and cognitive style were assessed within two weeks of one another, in May of the kindergarten year. A general assessment of each child's social, emotional, and cognitive development, derived from an observation scale, had been completed by the teacher approximately five months earlier, in November of the kindergarten year. When children who had participated in the study during the kindergarten completed first grade the following year, their school achievement in vocabulary, reading comprehension, and mathematics concepts was assessed by means of the Iowa Tests of Basic Skills, and the predictive relationships among readiness, style, and learner self-concept and development variables and end-of-first grade achievement were examined.

Instrumentation

Cognitive style was assessed by means of the Matching Familiar Figures (MFF) Test (Kagan et al, 1964). Mean latency and total errors were recorded for each subject. School readiness was assessed by the Metropolitan Readiness Tests (MRT), developed by Hildreth et al (1969) and administered throughout the county school system for placement in first grade reading.* Student self-concept as a learner was assessed by the Florida Key (Purkey et al, 1973), a teacher rating scale which addresses four dimensions of student behavior (relating, asserting, investing, and

*Correspondence received from the publisher suggests substantial overlap between the MRT and measures of mental ability as well, with correlations between MRT Total and Otis-Lennon IQ as high as 0.76.

coping) to produce a total self-concept "score." Total scores earned by students on the Maryland Systematic Teacher Observation Inventory (MSTOI), an observation schedule which addresses development and is designed to identify children with potential learning problems during the kindergarten year, was included as a measure of general developmental level. School achievement was assessed by means of the Iowa Tests of Basic Skills, Level 7, Form 5 (Hieronymus and Lindquist, 1972). Subtest scores in vocabulary, comprehension of stories (reading), and mathematics concepts were analyzed separately. An achievement composite, equal to the sum of the raw scores earned on each of the three subtests, was generated also for each subject.

Subjects

The subjects in the study included thirty-eight children (eighteen males and twenty female subjects) with a median age of approximately six years who constituted the kindergarten class at the elementary school studied. All but two of the subjects (who had left the county school system) took the Iowa Tests of Basic Skills at the end of the first grade.

Data Collection

The MSTOI was completed for each subject by his/her kindergarten teacher during November of the kindergarten year. The MRT was administered to groups ranging in size from four to seven children during May of the kindergarten year. Following teacher orientation to the Florida Key, this instrument was completed by each kindergarten teacher for students in her class during May. At the same time, after a brief training session for the two full-time teacher aides assigned to the kindergarten program at the school, the experimenter and the aides began to administer the MFF to each student. The instrument was administered twice to each child in

sessions one week apart in order to establish its reliability. All subjects who remained in the school system to complete the first grade (36 of 38 subjects, 35 of whom remained at the same elementary school) were then administered three subtests of the Iowa Tests of Basic Skills at the end of the first grade in order to assess their achievement in reading and mathematics.

Design and Analysis

The design called first for an assessment of the reliability of the MFF with this sample of subjects. This was to be accomplished by correlating error and latency data obtained from two administrations of the instrument. Second, analysis of the intercorrelations among all instruments was undertaken as a means of exploring the correlates of cognitive style. Third, with first grade achievement in vocabulary, reading comprehension (stories), and mathematics concepts, taken separately and combined, as criteria, analysis was undertaken of the predictive power of cognitive style, operationally defined as error and mean latency, after Kagan's construct, and as tempo and efficiency, after the Salkind and Wright model. Multiple regression techniques were used to determine the contribution of each dimension of style, readiness, and teacher ratings to the prediction of school achievement. Stepwise regression was then employed to determine specifically whether reflection/impulsivity and/or efficiency would enhance the predictability of achievement after variance due to readiness was removed; the identification of style as a significant predictor of achievement independent of readiness would be of practical significance to the school system, which administers readiness tests to all students and is continually seeking additional sources of information about individual students in order to design the most appropriate methods of

instruction. All statistical programs used in the analyses performed on the data are included in the SPSS package (Nie et al, 1975).

Results

Scores were verified against the MFF norms for five- and six-year olds provided by Salkind (1978). Relative to the stability of the scores, it was determined that MFF latency was highly stable over the one-week interval. Test-retest correlations varied from 0.58 ($p < .01$) for males to 0.95 ($p < .01$) for females, with a reliability of 0.87 ($p < .01$) for the total group. MFF total error reliabilities were somewhat lower but still substantial: 0.60 ($p < .01$) for males, 0.72 ($p < .01$) for females, and 0.64 ($p < .01$) for the total group. As expected, total errors and mean latency were negatively correlated ($r = -0.42$, $p < .01$) for the total group. Reliabilities of the impulsivity and efficiency composites approximated the reliabilities of each component. Pre- and post-impulsivity scores were correlated 0.68 ($p < .01$) for the total group, while pre- and post-efficiency scores were correlated 0.67 ($p < .01$). Male and female reliabilities varied slightly.

Examination of relationships between dimensions of cognitive style and teacher developmental rating indicated that only MFF total error was related to MSTOI score ($r = -0.45$, $p < .01$). Both composites also correlated with MSTOI although the relationship was slight ($r = -0.33$, $p < .025$, for impulsivity; and $r = -0.36$, $p < .015$, for efficiency). Interestingly, sex differences emerged in these relationships also. Among boys, only efficiency, among the four indices of style, was significantly related to MSTOI score ($r = -0.40$, $p < .05$); among girls, MFF total error and impulsivity were both significantly correlated with MSTOI ($r = -0.54$, $p < .01$, and

$r = -0.42$, $p < .04$, respectively). Similar correlational patterns were observed with the Florida Key, although latency as well as total error was related to self-concept when male and female data were combined ($r = 0.28$, $p < .05$, for mean latency, and $r = -0.33$, $p < .02$, for total errors). Impulsivity was also slightly but significantly related to self-concept ($r = -0.28$, $p < .05$), while efficiency was unrelated.

Correlations between readiness and the four indices of style supported earlier findings. MFF mean latency was unrelated to readiness, while total error was moderately related ($r = -0.54$, $p < .01$). Correlations for males and females were identical. Both impulsivity and efficiency were significantly correlated with readiness. Efficiency, as expected, was slightly more highly related than impulsivity ($r = -0.40$, $p < .01$, for efficiency, versus $r = -0.34$, $p < .05$, for impulsivity). Only efficiency, moreover, was correlated with readiness among females ($r = -0.49$, $p < .01$), while only impulsivity was correlated with readiness among males ($r = -0.41$, $p < .05$).

Standard regression analysis was employed to determine the relative contributions of readiness, style, developmental level, and self-concept to the prediction of achievement at the end of first grade. Analyses were undertaken separately for vocabulary, reading comprehension, and mathematics concepts. In addition, an achievement composite, equal to the sum of the raw scores on each subtest, was computed for each subject and represented another criterion variable. Results of the analysis indicated that a combination of readiness test score, teacher rating of developmental level and self-concept, and cognitive style explained a significant amount of variance in school achievement. As Table 1 indicates, with MFF total error and mean

latency as cognitive style variables, significant multiple correlations were obtained for mathematics concepts and composite achievement for the total group. The predictive power of the four variables appeared to be somewhat greater for females than for males. When cognitive tempo (impulsivity) and efficiency were substituted for mean latency and total error in the prediction equation, the amount of variance in vocabulary achievement explained by the predictor set became significant as well for the total group.

Examination of the independent contribution to the prediction of achievement made by mean latency and total error indicates that these variables account for little variance among individuals (see Table 2). However, when tempo is considered, significant part correlations are apparent for the total group in each achievement area except mathematics. Efficiency, somewhat surprisingly, failed to account for significant variance in any achievement area after readiness, developmental level, self-concept, and tempo were removed.

Finally, in an attempt to explore further the contribution made by tempo and efficiency to the prediction of achievement with readiness taken into account, a stepwise regression analysis was performed with each skill area taken in turn as the criterion and with readiness, impulsivity, and efficiency entered into the prediction equation. As Table 4 indicates, while readiness alone accounts for a significant amount of variance in achievement in all three skill areas, tempo added to the prediction in vocabulary and reading (see Table 4). Once again, efficiency added nothing to the prediction.

Discussion

A review of the results of this research suggests that the MFF can

assess with reasonable consistency response latency and error (and the style composites, tempo and efficiency) in kindergarten children. While the short-term reliability of the instrument appears fairly satisfactory, the long-term reliability with young children remains, of course, open to question. Moreover, reliability appears to vary somewhat with sex, possibly because of differences in development between boys and girls of kindergarten and primary-school age.

As expected, MFF mean latency was unrelated to readiness and developmental level, supporting the contention of a majority of researchers that response speed itself is less important than accuracy to school success. However, the combination of mean latency and total errors in the tempo composite, the impulsivity-reflectivity continuum suggested by Salkind and Wright, added substantially to the prediction of first grade achievement . With readiness, developmental level, self-concept, and processing efficiency removed from the prediction equation, impulsivity accounted for significant achievement variance among females particularly. Efficiency added little to the predictive power of the other variables, doubtless because of its high correlation with them.

The surprisingly strong relationships between cognitive tempo and achievement which emerged from this study suggest a need for replication as a means of exploring further the dynamics of cognitive style. Particular attention to the developmental aspects of style and processing efficiency appears to be warranted at this time.

References

Achenbach, T. M., & Weisz, J. R. Impulsivity-reflectivity and cognitive development in preschoolers: a longitudinal analysis of developmental and trait variance. Developmental Psychology, 1975, 11 (3), 413-414.

Ault, R. L.; Crawford, D. E.; & Jeffrey, W. E. Visual scanning strategies of reflective, impulsive, fast-accurate, and slow-accurate children on the Matching Familiar Figures test. Child Development, 1972, 43, 1412-1417.

Becker, L. D. Conceptual tempo and the early detection of learning problems. Journal of Learning Disabilities, 1976, 9(7), 433-442.

Bentler, P. M., & McClain, J. A multitrait-multimethod analysis of reflection-impulsivity. Child Development, 1976, 47, 218-226.

Block, J.; Block, J. J.; & Harrington, D. M. Some misgivings about the Matching Familiar Figures test as a measure of reflection-impulsivity. Developmental Psychology, 1974, 10(5), 611-632.

Egeland, B., & Weinberg, R. The Matching Familiar Figures Test: a look at its psychometric credibility. Child Development, 1976, 47, 483-491.

Haskins, R., & McKinney, J. D. Relative effects of response tempo and accuracy on problem solving and academic achievement. Child Development, 1976, 47, 690-698.

Hieronymus, A. N., & Lindquist, E. F., eds. Iowa Tests of Basic Skills. Level 7, Form 5. Boston: Houghton-Mifflin Company, 1971.

Hildreth, G. H.; Griffiths, N. L.; & McGauvran, M. E. Metropolitan Readiness Tests. New York: Harcourt, Brace & World, Inc., 1969.

Kagan, J.; Rosman, B. L.; Day, D.; Albert, J.; & Phillips, W. Information processing in the child: significance of analytic and reflective attitudes. Psychological Monographs, 1964, 78 (Whole No. 578).

Maryland State Department of Education, Division of Instruction. Maryland Systematic Teacher Observation Instrument. Baltimore: Maryland State Department of Education, 1975.

Messer, S. Reflection-impulsivity: stability and school failure. Journal of Educational Psychology, 1970, 61(6), 487-490.

Nadeau, G. H. Cognitive Style in Preschool Children: a Factor Analytic Study. Unpublished doctoral dissertation, University of Minnesota, 1968.

Nie, N. H.; Hull, C. H.; Jenkins, J. G.; Steinbrenner, K.; & Bent, D. H. Statistical Package for the Social Sciences (SPSS). New York: McGraw-Hill, 1975.

Purkey, W. W.; Cage, B.; & Graves, W. "The Florida Key": a scale to infer learner self-concept. Educational and Psychological Measurement, 1973, 33, 979-984.

Salkind, N. J. The development of norms for the Matching Familiar Figures test. Paper presented at the Annual Meeting of the American Educational Research Association, Toronto, Canada, March 27-31, 1978.

Salkind, N. J., & Wright, J. C. The development of reflection-impulsivity and cognitive efficiency: an integrated model. Human Development, 1977, 20, 377-380.

Toner, I. J.; Holstein, R. B.; & Hetherington, E. M. Reflection-impulsivity and self-control in preschool children. Child Development, 1977, 48, 239-245.

Wright, J. C. The KRISP: a technical report. St. Louis, Missouri: CEMREL, Inc., 1973.

Table 1

Multiple Correlations between Achievement, Readiness, Self-Concept, Level of Development, and Cognitive Style

Criterion	Subjects	Predictor Set #1 Multiple R	Predictor Set #1 R^2	Predictor Set #2 Multiple R	Predictor Set #2 R^2
Vocabulary	Males	0.77	0.59	0.77	0.59
	Females	0.85*	0.72	0.85*	0.72
	Total	0.57	0.32	0.65*	0.42
Reading Comprehension	Males	0.91*	0.83	0.91*	0.83
	Females	0.70	0.49	0.70	0.49
	Total	0.54	0.29	0.61	0.37
Mathematics Concepts	Males	0.83	0.69	0.83	0.69
	Females	0.83*	0.69	0.83*	0.69
	Total	0.71*	0.50	0.73*	0.53
Composite Achievement	Males	0.85	0.72	0.85	0.72
	Females	0.86*	0.74	0.86*	0.74
	Total	0.69*	0.48	0.75*	0.56

*p .05

[1]Predictor variables include MRT Total, Florida Key Total, MSTOI Total, MFF Mean Latency, and MFF Total Errors

[2]Predictor variables include MRT Total, Florida Key Total, MSTOI Total, MFF Style Composite, and MFF Efficiency Composite

Table 2

Univariate and Part Correlations between MFF Error and Latency and Four Achievement Variables

Criterion	Subjects	Univariate Correlations		Part Correlations	
		MFF Latency	MFF Errors	MFF Latency[1]	MFF Error[2]
Vocabulary	Males	-0.50*	0.23	0.44	0.08
	Females	-0.24	-0.12	0.43	0.21
	Total	-0.22	-0.01	0.29	0.09
Reading Comprehension	Males	-0.54*	0.39	0.41*	0.04
	Females	-0.14	-0.12	0.39	0.15
	Total	-0.19	0.05	0.24	0.15
Mathematics Concepts	Males	-0.43*	-0.20	0.31	0.16
	Females	0.16	-0.48*	0.10	0.00
	Total	-0.01	-0.37*	0.14	0.17
Composite Achievement	Males	-0.19	-0.29	0.48*	0.00
	Females	0.21	0.16	0.39	0.17
	Total	0.08	-0.07	0.31	0.05

*p .05

[1]MRT, MSTOI, Florida Key, and MFF Errors out

[2]MRT, MSTOI, Florida Key, and MFF Latency out

Table 3

Univariate and Part Correlations between Composite Style and Efficiency and Four Achievement Variables

Criterion	Subjects	Univariate Correlations		Part Correlations	
		Impulsivity	Efficiency	Impulsivity[1]	Efficiency[2]
Vocabulary	Males	0.48*	-0.27	0.42	0.14
	Females	0.07	-0.39	0.50*	0.13
	Total	0.25	-0.25	0.49*	0.03
Reading Comprehension	Males	0.61*	-0.20	0.36	0.16
	Females	0.01	-0.28	0.42	0.15
	Total	0.25	-0.19	0.39*	0.04
Mathematics Concepts	Males	0.18	-0.52*	0.21	0.31
	Females	-0.36	-0.34	0.00	0.15
	Total	-0.15	-0.42*	0.06	0.20
Composite Achievement	Males	-0.06	-0.43*	0.42	0.24
	Females	-0.03	0.36	0.41*	0.07
	Total	-0.04	-0.04	0.40*	-0.09

*p .05

[1]MRT, MSTOI, Florida Key, and Efficiency out

[2]MRT, MSTOI, Florida Key, and Impulsivity out

Table 4

Summary of the Stepwise Regression Procedure: Total Group

Criterion: ITBS Vocabulary

Step	Variable	Additional R^2	NDF	Partial F
1	MRT Total(X_1)	0.20	1,30	7.60**
2	Impulsivity(X_2)	0.15	1,29	6.01*
3	Efficiency(X_3)	0.00	1,28	0.14

Regression equation: $Y = 1.15 + 0.26X_1 + 1.52X_2 - 0.35X_3$; Multiple $R^2 = 0.36$

Criterion: ITBS Reading Comprehension—Stories

Step	Variable	Additional R^2	NDF	Partial F
1	MRT Total(X_1)	0.19	1,30	6.89*
2	Impulsivity(X_2)	0.12	1,29	4.94*
3	Efficiency(X_3)	0.00	1,28	0.02

Regression equation: $Y = .22X_1 + 1.15X_2 + 0.11X_3 - 2.08$; Multiple $R^2 = 0.31$

Criterion: ITBS Mathematics Concepts

Step	Variable	Additional R^2	NDF	Partial F
1	MRT Total(X_1)	0.45	1,30	24.23**
2	Efficiency(X_2)	0.02	1,29	2.24
3	Impulsivity(X_3)	0.00	1,28	0.01

Regression equation: $Y = 7.36 + 0.23X_1 - 0.96X_2 - 0.05X_3$

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*p .05

**p .01